#### Appendix C

Scoping Process to Determine Potential Contaminants of Concern



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July 11, 1992

Ms. Carol Mascarenas Mailstop 3202 Westinghouse Idaho Nuclear Company, Inc. 1955 Fremont Ave P.O. Box 4000 Idaho Falls, ID 83403

SUBJECT: Draft Contaminants of Concern (COC) Tables for CPP-26, -32E, and 79

Dear Carol:

Enclosed are the COC tables for the three sites within OU 3-7. The calculations have now been reviewed with only minor modifications since the draft tables (dated July 8). Also enclosed is a summary table listing the COC as compared to the list identified in the April 30, 1992 document. Attached to this table is a copy of the April 30 data with boxes highlighted that have changed in this current submittal. Finally, enclosed is a memo-for-file describing the calculations that were performed to develop screening concentrations in situations were no analytical data existed.

Four additional solvents were added per our telephone conversation of July 10. In all cases, these new organics are identified as COC since no data was provided as to their possible concentration. As soon as an estimated concentration is available, it is likely that some, if not all, can be dropped out since the risk based concentrations are usually quite high.

Please let me know if you have any questions.

Sincerely,

Keith D. Davis, P.E.

With And

Project Manager

KDD/048/0792 Enclosure

cc: O. K. Earle, WINCO

#### Contaminants of Concern April 30, 1992 Draft Document Vs. Current (July) Documentation

| Contaminant of Concern | СР    | P-26    | СРР   | -32E    | CP    | P-79    |
|------------------------|-------|---------|-------|---------|-------|---------|
|                        | April | Current | April | Current | April | Current |
| Strontium-90           |       | х       |       | x       |       | x       |
| Technetium-99          |       | х       |       | х       |       | х       |
| Ruthenium-106          | X     |         |       |         |       | , ag    |
| Iodine-129             |       | х       |       | х       |       | x       |
| Cesium-137             |       | х       |       | х       |       | х       |
| Uranium-234            |       | х       |       | х       |       | X       |
| Uranium-235            |       | Х       | i     | х       |       | х       |
| Uranium-238            |       | х       |       |         |       |         |
| Neptunium-237          |       | x       |       | х       |       | х       |
| Plutonium-238          |       | х       |       | x       | _     | х       |
| Plutonium-239          |       | x       |       | х       |       | х       |
| Plutonium-240          |       | х       |       | x       |       | X       |
| Płutonium-242          | х     | х       |       |         |       |         |
| Americium-241          |       | X       |       | X       |       | X       |
| Radionuclides          |       |         | X     |         | х     |         |
| Boron                  | x     |         | X     |         | х     |         |
| Cadmium                | х     | X       | Х     | X       | х     | x       |
| Chromium               | Х     | х       | х     |         | х     |         |
| Fluoride               |       | x       |       |         | х     |         |
| Manganese              |       | х       |       |         |       |         |
| Mercury                | х     | x       | х     | х       | х     | х       |
| Molybdenum             | Х     |         | х     |         | Х     |         |
| Nickel                 | х     | х       | х     |         | х     |         |
| Nitrate                |       | х       |       |         |       | x       |



## OPERABLE UNIT 3-07 TANK FARM I CONTAMINANTS OF CONCERN

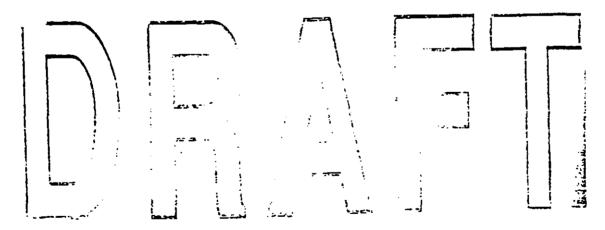
April 30, 1992

#### OPERABLE UNIT 3-07, TANK FARM Contaminants of Concern

The following is a list of contaminants of concern (COC) for each site being sampled in Operable Unit 3-07. The known contaminants (radionuclides) for CPP-26 were screened against all pathways and using current concentrations (i.e. allowing for decay). The potential metals at CPP-26 and potential contaminants at sites CPP-32E and -79 do not have site specific data available to screen against. Back calculations were performed for each contaminant per pathway. These results were compared to determine contaminants of concern per pathway and the limiting soil concentrations. Tables 1 and 2 present the results of this evaluation. As shown on Tables 1 and 2, all contaminants in the groundwater pathway, with the exception of boron, molybdenum and chromium, fall out of the risk criteria.

SITE CONTAMINANT OF CONCERN 26 Plutonium 242 Ruthenium Cadmium Chromium Nickel Molybdenum Boron Mercury 32E; 79 Radionuclides Cadmium Chromium Nickel Molybdenum Boron Mercury Fluoride\*

NOTE: (\*) Only applicable to CPP-79



CONTAMINANTS OF CONCERN RESIDENTIAL SCENAIRO CPP.26

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COC 2 z z z z z Z z > z > z z z > - 고[ > > CONCENTRATION ESTIMATED CURRENT à. Unknown Unknown Unknown Unknown 3.4BE-10 Unknown Udknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown 1.97E·B 2.01E 7 .2,73E.1 3E-5 0 E-04(B. 13) EXPOSURE EXTERNAL 4 2.1E+00 3 SE + 37 4 16 1 11 ۲ ž ۲ 2 ž ž ž ž > 10000frs + >5Hg's GROUNDWATER™ (3) > 1000 yrs (kd > 2) > 1000 yre(kd>2] >1000 vie + >vit -> 1000 pre < 1000 yrs > 1000 yre < 1000 yrs > 1000 yrs < 1000 yrs > 1000 yrs No health based concentrations No health base concedirations No health based concentration No health based concentration No health based concentration Reject: per Track 2 Guidance Reject per Track 2 Buidance Roject: pet Track 2 Guldend INHIDUST 2 4.3E +36 1.9E + 00 4.8E+13 1.4E+40 0.3E-05 D. BE. 27 No health based concentrations Metals; Assumed based on HLLW constituents; Img/kg/ BE-03 Š 2 INGESTION Ξ 1.32E + 02 1.08£ + 00 KNOWN RADIONUCLIDES (pCI/g) 1.2E + 01 2.5E+31 2 6E + 40 3 5€ + 15 2.7E+02 2.7E+05 5.4E+03 B. 1E + 01 2 9 CONTAMINANT Chromium III Molybdenum Gadolinium Ruthenhim Aluminum Palfadium Cadmium Mercury NOTES: Rhodium Ru-106 Niobium Pr-103 Pu 242 ee 144 Cs-137 Ce-134 Sodium Nickel Boron ron

\*

Using a 20m effective thickness to groundwater (16m average interbed thickness + 4m alluvium below contaminated zone).

NA: Not Applicable ND: Not determined (no health based concentration) CONTAMINANTS OF CONCERN RESIDENTIAL SCENARIO CPP-32 E

| CONTAMINANT        | INGESTION<br>(1)      | INH /DUST<br>(2)  | GROUNDWATER" (3)    | EXTERNAL<br>EXPOSURE<br>(4) | ESTIMATED<br>CURRENT<br>CONCENTRATION<br>(5) | <b>3</b> |
|--------------------|-----------------------|---|---------------------|-----------------------------|--|----------|
|                    |                       |   |                     |                             |  |          |
|                    | (A) DEBIVED FROM TYPI | TYPICAL HELL W CONSTITUENTS                                 | 115                 |                             |  |          |
| HADIONOCLIDES INC. | GN.                   | Q.  | > 1000 YRS (kd > 2) | QN                          | Unknown                                      | 2        |
| Europium: 155      | 0.36                  | 1 75 + 10   | > 1000 yrs.         | 4.0E+02                     | Unknown                                      | Note (1) |
| Coball 60          | 1 35 1 07             |   | > 1000vrs + 5HL/4   | ND T                        | Uknwn  | 2        |
| Zirconium 95       | QN                    | CN  |                     | AM                          | Olknown                                      | Note 111 |
| Ruthenium 106      | 34+31                 | 5,0€+27   |                     |                             | Ilabanda                                     | 2        |
| Antimony-125       | ND                    | (QN   | > 1000yrs + 511.    |                             | The same                                     | Note (1) |
| Cesium-134         | 3.6+01                | 1.6E t 20   | 1000yrs + 5         |                             | Litrory                                      | Note [1] |
| Cesium-137         | 1.3E + 02             | 6 0E-D6   | > 1000yrs + 5/IL 6  |                             |  | 111      |
| Cerium-144         | 2.6E + 40             | 14E 43  | >1000 yrs           | 3.54 + 32                   | Unknown                                      | Note     |
| Europium 154       | 4.0E+05               | 4.6E 08   | - 10 Oyes + PHL's   | 4.7E 00                     | Unknown                                      | Note (1) |
| Strontium-90       | 1.2E+02               | .2.2E+ 06   |                     | 2                           | Unknown                                      | Note (1) |
|                    |                       |   |                     | - Lux:                      | Unknown                                      | ٨        |
| Tritium            | cannot meature soil a | cannot measure soil activity; Will be tested for it grounds | 000                 | 1.8F + 00                   | Unknown                                      | Note (1) |
| Ursnium.234        | 2.6€+00               | 4.16+02   | 2 0001 ×            |                             | 4.4  | Note (1) |
| Uranium-235        | 2.9E+00               | 4.4E+02   | > 1000 yrs          | 1.0E-02                     | Olivaio                                      |          |
| Uranium 238        | 2 B E + 00            | 4.8E+02   | > 1000 yrs          | 2.2E + 00                   | Unknown                                      | Note (1) |
| Plutonium 238      | 2.9£ + 00             | 6.0E+02   | > 1000 yrs          | 3.7E+00                     | Unknown                                      | Note (1) |
| Plutonium-239      | 1.26 + 01             | 2.2E+02   | > 1000 yrs          | 3.9E+00                     | Unknown                                      | Note (1) |
| Plutonium 240      | 1.26+01               | 2.8E+02   | > 1000 yrs          | 1.7E+00                     | Unknown                                      | Note (1) |
| 1                  | 6.06+37               | 3.6E+41   | > 1000 yrs (kd > 2) | 3.4E+32                     | Unknown                                      | Note (1) |
| Mn.54              | 20.01                 |   |                     |                             |  |          |



| CPP 32E             |  |                                |              |                             |                                       | 202         |
|---------------------|--|--------------------------------|--------------|-----------------------------|---------------------------------------|-------------|
| CONTAMINANT         | INGESTION<br>(1)                                     | INH/DUST<br>(2)                | GROUNDWATER" | EXTERNAL<br>EXPOSURE<br>(4) | CURRENT<br>ESTIMATED<br>CONCENTRATION | 200         |
|                     |  | tmothol                        |              |                             |                                       |             |
| Metals; Assumed bar | Metals; Assumed based on IILL W Constitueine, Imgray | in August                      |              |                             |                                       | 3           |
| Alimina             |  | Reject per Track 2 guidance    | ance         |                             | Unknown                               | 2           |
|                     | 2 35 102   | QN                             | > 1000 yrs   | NA                          | Unknown                               | <b>&gt;</b> |
| Cadmin              | 2017/2   | No bealth based concentrations | lirations    | ٤                           | Unknown j                             | z           |
| Niobium             |  |                                |              |                             |                                       |             |
| Sodium              |  | Reject: per Track 2 Guidance   | dance        |                             | Unknown                               | 2           |
| fron                |  | Reject: per Track 2 Gui        | 2 Guidance   |                             | Unknown                               | Z           |
| Cheomium III        | 2.7E+05  | 4.2E 7 00                      | < 1000 yrs   |                             | Unknown                               | ٨           |
|                     | 5. dF : 03   |                                | >1000 y/s    | N.A.                        | Unknown                               | ٨           |
| NICKE               |  |                                |              |                             | Unknown                               | _کـ         |
| Gadolinium          |  | No health traced vonce         |              | 1                           |                                       | 2           |
| Molybdenum          | 1.08E + 00   |                                | < 1000 yrs   | AN                          | Unknown                               |             |
| Ruthenium           |  | No health based tancentration  | of ation     |                             | Unknown                               | Z           |
| Rhodium             |  | No health based concentration  | Itration     |                             | Unknown                               | Z           |
| Palladium           |  | No health based concentration  | ntration     |                             | Unknown                               | 2           |
| <u> </u>            | ND   | ND                             | < 1000 yre   | NA                          | Unknown                               | <b>&gt;</b> |
| Mercury             | 8.1E+01  | 6.4E+02                        | > 1000 yrs   | NA                          | Unknown                               | <b>&gt;</b> |
|                     |  |                                |              |                             |                                       |             |

(1) These constituents are COC based upon the soil pathway only. No site specific data or process knowledge is available to eliminate any COC.

(a) Using a 20m effective thickness to groundwater (16m average interbed thickness + 4m alkivium below contaminated zone).

NA: Not Applicable

ND: Not determined (no health based concentration)

CONTAMINANTS OF CONCERN RESIDENTIAL SCENARIO CPP-79

COC Note [1] Note [1] Note [1] Note (1) Note (1) Note (1) Note (1) Note (1) Note 11 Note [1] Note [3] Nete 11) Note 11) Note (1) z z CONCENTRATION ESTIMATED CURRENT 2 Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown. Juknown Uknown Unknown Unknown Juking Whi ıknown Unknowr Unknown EXTERNAL EXPOSURE 3.9E+00 1.7E+00 3.4E+32 4.7E.1001 3.7E+00 1.8E+00 2.2E + 00 1.0E-02 4.0E+02 ۲ ŝ Ę Z 4 z > 1000 yrs [kd>2] > 1000 YRS [kd > 2] GROUNDWATER" > 1000yrs + 5HL's 9,7HS 5HL's >1000vie 5HL's k belore grandwaler > 1000 yrs > 1000 yrs > 1000 yrs > 1000 yre > 1000 yrs > 1000 yre ( > 1000yre J > 100dyrs > 1000 yrs D cays 11 > 1000 yrs 1>5 Hite RADIONUCLIDES (pCi/g) DERIVED FROM TYPICAL HILW CONSTITUENTS cannot measure soil activity; will be tested for INII /DUST 4.5E+07 3,9E + 05 8.5E+01 6.3E 140 17.3E+01 1.1E+02 5.0E+01 7.8E + 01 4.0E 1.01 2.8E i 19 2.4E+42 6.5E+09 2.9E+33 1.0E-06 No. ğ ð INGESTION 5.6E+37 2.6E+00 2.8E + 00 2.9E + 00 1.2E + 01 1.2E + 01 2.9E+01 3.56 + 15 1.3E + 02 2.6E i 40 4.0E+05 1.2E + 02 1.3E+07 3.5+01 9 2 2 CONTAMINANT Plutonium.240 Plutonium.239 Plutonium-238 Ruthenjum-106 Antimony-125 Europium 155 Europium 154 Uranium 235 Uranium-238 Strontium-90 Uranium-234 Zirconium-95 Cesium-134 Cesium-137 Cerium-144 Mn-64-7 Cobalt 60 Tritium

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| CONTAMINANT          | INGESTION<br>(1)                                    | INIT/DUST<br>(2)               | GROUNDWATER⁴<br>(3) | EXTERNAL<br>EXPOSURE<br>(4) | CURRENT<br>ESTIMATED<br>CONCENTRATION<br>(5) | 202      |
|----------------------|---|--------------------------------|---------------------|-----------------------------|--|----------|
| Metals; Assumed base | Metals: Assumed based on HLLW constituents: Img/kg) | e; [mg/kg]                     |                     |                             |  | -        |
| Aluminum             |   | Reject per Track 2 guidance    | lance               |                             | Unknown                                      | 2        |
| Cadminm              | 2.7E+02   | QN                             | > 1000 yrs          | NA                          | Unknown                                      | ٨        |
| Niobium              |   | No health based concentrations | ntrations           |                             | Unknown                                      | z        |
| Sodium               |   | Rejeat: per Track 2 Guidance   | idance              |                             | Unknown                                      | Z        |
| Iron                 |   | Reject: per Track 2 Buidance   | dence               |                             | Miskadon                                     |          |
| Chromium (II         | 2.7E+05   | 4.2E+00                        | <1000 //8           | Ava                         | Unknown                                      | >        |
| Nickel               | 5.4E+03   |                                | ->:1000/γιε         | J V                         | ONKIDOWA                                     | >        |
| Gadolinium           |   | No health based concentrations | ntrations           |                             | Unkrown                                      | Z        |
| Molybdenum           | 1.08E+00 +  | d di                           | > \000\v            | T <sub>2</sub>              | Unknown                                      | >        |
| Ruthenium            |   | No health based concentration  | ntration            |                             | Unknown                                      | 2        |
| Rhodium              |   | No health based concentration  | ntration            |                             | Unknown                                      | 2        |
| Palfadium            |   | No health based concentration  | ntration            | 7.07                        | Unknown                                      |          |
| Boron                | DN  | QN                             | < 1000 yrs          | ¥.                          | Unknown                                      | <b>A</b> |
| Flouride             | 2E + 04   | ND                             | < 1000 yre          | ND                          | Unknown                                      | *        |
| Mercury              | 8.1£+01   | 6.4E+02                        | > 1000 yrs          | NA                          | Unknown                                      | ٨        |
|                      |   |                                |                     |                             |  |          |

NOTES:

These constituents are COC based upon the soil pathway only. No site specific data or process knowledge is available to eliminate any COC.

(a) Using a 20m effective thickness to groundwater (16m average interbed thickness + 4m alluvium below contaminated zone).

NA: Not Applicable

ND: Not determined (no health based concentration)

### CONTAMINANTS OF CONCERN RESIDENTIAL SCENARIO CPP:26

| L Z                                   |   |                               |                     |                                     | Ì                              |                                |               |                                |               |                                |             |                        |                        |                        |                          |                                |                             |                             |                             |                              |
|---------------------------------------|---|-------------------------------|---------------------|-------------------------------------|--------------------------------|--------------------------------|---------------|--------------------------------|---------------|--------------------------------|-------------|------------------------|------------------------|------------------------|--------------------------|--------------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|
| CONTAMINANT<br>OF CONCERN<br>(Y or N) |   | <b>&gt;</b>                   | (E) N               | <b>&gt;</b>                         | N (2)                          | N (2)                          | ٨             | N (2)                          | N (2)(4)      | N (3)                          | *           | N (2)                  | ٨                      | N (2)(4)               | (E) N                    | N ()                           | Y                           | <b>&gt;</b>                 | *                           | <b>&gt;</b>                  |
| CURRENT<br>ESTIMATED<br>CONCENTRATION |   | Unknown                       | Unknown             | Unknown                             | Unknown                        | Unknown                        | Unknown       | O (decayed)                    | 2.0E.05       | Unknawn                        | Unkniwn     | 2.6E-04                | 2.7E+02                | 6.4E-07                | Unknown                  | Unknown                        | Unknown                     | Unknown                     | Unknown                     | Unknown                      |
| EXTERNAL<br>EXPISURE                  |   | VV                            | 4 0E+02             | NA                                  |                                |                                | 2.9E+03 (3)   |                                | ٧N            |                                | 6.7E-02     | 4.3E+11                | 3.0E-02 (Ba-137)       | 3.5E+37                | 4.7£+(x)                 |                                | 1,85+00                     | 1.08-02                     | 2.2E+00(3)                  | 5.6E-02                      |
| GROUNDWATER"                          |   | will be tested                | 2,450yrs at Kd = 10 | 774yrs at Kd=3<br>( > 7 half lives) | 144,050yrs at KJ = 600         | 54yrs at Kd=0                  | 4.05+00       |                                | 54yrs at Kd=0 | 12,050yrs at Kd = 50           | 2.68-02     | 120.050yrs at Kd = 500 | 120.050yrs at Kd = 500 | 120,050yrs at Kd = 500 | 1.5E+02<br>54yrs at Kd=0 | Total decay in 33yrs           | 4,2E-02<br>1,490prs at Kd=6 | 4.5E-07<br>1,490yrs at Kd=6 | 4 SE-02<br>1,490yrs at Kd=6 | 1.96-02<br>(Assumed Kd == 0) |
| INII/DUST                             | stituents   | iy iiy                        | 1 2E + ()6          | 7.0E+01                             | lions                          | ikons                          | 4,3E+01       | lions                          | 2.6E+29       | lions                          | 2.9E+00     | 4.8E+13                | 1.9E+02                | 4.JE+36                | 8.IE+03                  | lions                          | E-02                        | 1.4E-02                     | 1.5E-02                     | 1.06-02                      |
| INGESTION                             | Radionuclides (pCi/g); Assumed based on HLLW constitu | cannot measured soil activity | 1.38+07             | 1.26+02                             | No health based concentrations | No health based concentrations | 2,9E+02       | No health based concentrations | 1,3E+31       | No health based concentrations | 2.0E+00     | 3.5E+15                | 1.3E+02                | 2.6E+40                | 4.0E+0\$                 | No health based concentrations | 2.68+00                     | 2.9E+00(3)                  | 2.9E+00 (3)                 | 1.46+00                      |
| CONTAMINANT                           | Radioniclides (pCi/g); As                             | Tritium                       | Cobali 60           | Strontium 90                        | Zirconum-95                    | Niobium 95                     | Technetium 99 | Ruthenium-103                  | Ruthenium-106 | Antimony-125                   | liuline-129 | Cesium-134             | Cesium-137             | Cerium 144             | Europium:154             | Europium-155                   | Uranium-234                 | Uranium-235                 | Uranium-238                 | Neptunium-237                |

### CONTAMINANTS OF CONCERN RESIDENTIAL SCENARIO CPP-26

|                       |  |                        |                                 |               | TNEAGIL                 | CONTAMINANT                                   |
|-----------------------|--|------------------------|---------------------------------|---------------|-------------------------|---|
| CONTAMINANT           | INGESTION  | INH/DUST               | GROUNDWATER'                    | EXTERNAL      | ESTIMATED CONCENTRATION | OF CONCERN (Y or N)                           |
|                       |  |                        |                                 | , W. J. J. W. | Unknown                 | <b>*</b>                                      |
| Philonium-738         | 2.98+00  | 1.9E.02                | 5,330yrs at Kd=22               | 3./Etw        |                         | >   |
| 000                   | 1.78+01  | 7.0E-03                | 5,330yrs at Kd=22               | 3.98+00       | Unknown                 |   |
| Plutonium-237         | 10 Tak   | 8.8E-03                | 5,330yrs at Kd = 22             | 1.76+00       | Unknown                 |   |
| Plutonium-240         | 1.datol  | # #E 63                | 5.330yrs at Kd = 22             | 2.1E+00(3)    | 3.0E-02                 | Y   |
| Plutonium-242         | 1.2E+01(3)   |                        | o. 440 o. 17.4=340              | 6.35.02       | Unknown                 | Y   |
| Americium-241         | 1.45+00  | 1.0E-02                | 81.03tlyrs at Na-540            |               |                         |   |
| Non-Radioactive Compo | Non-Radiusclive Components (ng/kg); Assumed based on | J on HLLW constituents |                                 |               |                         | , z   |
|                       | n Track ? Guidance                                   |                        |                                 |               | Unknown                 |   |
| Aluminum              | Keject - timen - cui                                 |                        | VA New Available                | ž             | Unknown                 | Z   |
| Boron                 | 2.5£+04(3)   | No Data                | 1.2E+00                         | <b>4</b> Z    | Unknown                 | <b>*</b>                                      |
| Cadmium               | 2.76+02  |                        | 1,490yrs at Kd#6                |               | Unknown                 | Z   |
| Calcium               | Reject - Track 2 Guidance                            |                        |                                 |               | Total or and a second   | Z   |
|                       | N. Lank hased conceptation                           | lions                  |                                 |               | Ollahow                 |   |
| Chloride              | 1 4E + 03 (3)  | 3.6E-01                | 1.4E+00                         | ٧Z            | Unknown                 | ٨   |
| Chromum (VI)          |  |                        | 342yrs #1 Kd #1.4               |               | Unknown                 | ٨   |
| Fluoride              | 2.0E+04(3)   | No Data                | 1.1E+0!<br>54yn af Kd=0         | ₹<br>Z        |                         |   |
|                       |  |                        |                                 |               | Unknown                 | 2   |
| Gadalinium            | No health based concentrations                       | ations                 |                                 |               | Unknown                 | z   |
| Iron                  | Reject - Track 2 Guidance                            | 3:                     |                                 | 1             | Unknown                 | z   |
| Lead                  | 5.0E+02 (b)(3)                                       | No Data                | 24,050yrs at Kd= 100            | V2            | Linkagen                | >   |
| Manganese             | 2.7E+04(3)   | 935                    | 12,050yrs at Kd=50              | ₹Z            | Hakaawa                 | , <u>, , , , , , , , , , , , , , , , , , </u> |
| Mercury               | 8.2E+0i  | 5.4E+01                | 24,050yrs at Kd = 100           | ٧×            | Christer                | 2   |
| Molybdenum            | 1.1E+03(3)   | No Data                | 1.7E+01 (3) (Assumed $Kd = 0$ ) | NA            | Unknown                 | 2   |
|                       |  | 8                      | 1                               | <b>~</b> Z    | Unknown                 | ٨   |
| Nickel                | 5.4E+03 (3)  | 848                    | _                               |               | Unknown                 | Z   |
| Niobium               | No health hased concentrations                       | rations                |                                 |               |                         |   |

### CONTAMINANTS OF CONCERN RESIDENTIAL SCENARIO CPP.26

| CONTAMINANT                             | INGESTION  | INH/DUST    | GROUNDWATER" | EXTERNAL   | CURRENT<br>ESTIMATED<br>CONCENTRATION | CONTAMINANT<br>OF CONCERN<br>(Y or N) |
|---|--|-------------|--------------|------------|---------------------------------------|---------------------------------------|
|   | 2 7E + 04 (3)  | No Data     | 2.7E+0!      | <b>4</b> Z | Unknown                               |                                       |
| VIIIaic                                 | strains beautiful and allegans   |             |              |            | Unknown                               | z                                     |
| Palladisim                              | and the property of the proper | ion         |              |            | Uaknown                               | z                                     |
| Prosphorus                              | No nearth rescu concerns   |             |              |            | Unknown                               | Z                                     |
| Polassium                               | No beath based concentrations  | Society     |              |            | Unknown                               | z                                     |
| Khodium                                 | No health based concentrations   | licans      |              |            | Unknown                               | z                                     |
| VIIII CIIII CIII CIII CIII CIII CIII CI | o series Care Trees  |             |              |            | Unknown                               | z                                     |
| Sodium                                  | Reject - track - constitution  |             | 6.8E+02(3)   |            | Unknown                               | Z                                     |
| Sullate                                 | No health based concentrations   | i ooi       |              |            | Unknown                               | Z                                     |
| 7riconnum                               | 10 Health 041  | 3 6E + 03   | 2.1E+02      | N.         | Unknown                               | N (S)                                 |
| Hexane                                  | 10488  | 1.0E+01     | 1.45-02      | V.V.       | Unknown                               | ٨                                     |
| Tributed Phosphere                      | l a  | 4.5E+05 (6) | 5.1E+03      | ٧٧         | Unknown                               | N (5)                                 |
| 1 1 1 Trichlomethen                     | P()+23, c  | S.7E+04     | 5.46-01      | <b>₹</b> Z | Unknown                               | ٨.                                    |
| 1.1.2.Trichloroethane                   | 1.18+01  | 2.75+01     | 1.78+01      | <b>٧</b>   | Unknown                               | ٨                                     |
| Trichloroethylene                       | 5.8E+01  | 9.1E+01     | 5.45.02      | <b>Y</b> V | Unknown                               | Y                                     |

Using a 16m effective thickness to groundwater (interhed thickness only) as input to GW Screen.

For ingestion of lead, this was the concentration that causes increased blood lead levels in children.

Nox Applicable ē €

Shade: Shaded areas represent the potential pathways of concern for the COOC.

RATIONALE FOR DELETION AS COC

More than 7 half-lives will lapse during the 100 year institutional control period.

More than 7 half-lives have lapsed since the original meident in 1964. ≘ ຄ ຄ

Based on the highest value in HLLW for this contaminant, saturated soil would exhibit an activity/concentration of the same order of magnitude, or lower, as compared to the risk based concentration. Therefore, it is not a COC for this pathway. Saturated soil concentrations were calculated based on a soil porosity of 25% and a 45% soil weight of 1.5 mg/cc. Risk based concentrations are greater than or equal to the calculated specific activity of the pure radionuclide.

Although analytical data is currently unavailable, the risk based concentrations for these contaminants are significantly higher than process knowledge of the HLLW would allow. These solvents nust survive a steam stripper to get to the HLLW tanks. E E

These numbers are of the same order of magnitude, or higher, as would be obtained from soil saturated with pure product.

### CUNTAMINANTS OF CONCERN RESIDENTIAL SCENARIO CPP-32 E

| CONTAMINANT               | INGESTION   | INH/DUST      | GROUNDWATER™                            | EXTERNAL<br>EX MOSURE | CURRENT<br>ESTINATED<br>CONCENTRATION | CONTAMINANT OF CONCERN (Y or N) |
|---------------------------|---|---------------|---|-----------------------|---------------------------------------|---------------------------------|
|                           |   |               |   |                       |                                       |                                 |
| Radionuclides (pCi/g); As | Radionuclides (pCi/g); Assumed based on HLLW constituents | ittuenis      |   | *2                    | Unknown                               | Å                               |
| Tritium                   | cannot measured soil activity                             | ly            | will be fested                          |                       | Intrown                               | N(I)                            |
| Cohalt 60                 | 1.3E+07   | 3.7E+10       | 2,450yrs at Kd=10                       | 4 UE + UZ             |                                       |                                 |
| Strantium-90              | 1.26+02   | 2.7E+06       | 774yrs at Kd=3<br>( > 7 half-lives)     | NA                    | Unknown                               | -                               |
| i                         | No beath based concentrations                             | SUC:          | 144,050yrs at Kd = 600                  |                       | Unknown                               | N (2)                           |
| Zurconium:93              | advitering beautiful as                                   | soci          | 54yrs at Kd=0                           |                       | Unknown                               | N (2)                           |
| Niobinm-93                | NO DOBINI NASCO CINCON                                    |               | 3 55±03(3)                              | 2.9E+03(3)            | Unknown                               | Y                               |
| Technetium-99             | 2.9E+02   | 1.4E + UO (3) | (c) | √×.                   | Unknown                               | N (2)(4)                        |
| Ruthenium 106             | 1.36+31   | 8.4E+33       | 0 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - |                       | Unknown                               | N (I)                           |
| Antimony-125              | No health based concentrations                            | ions          | 25-byls at the -25                      |                       | Unknown                               | <b>*</b>                        |
| histine-129               | 2.05+00   | 9.4E+04(3)    | 3.15+01                                 | 0.15.02               |                                       | (c) z                           |
| Cesium-134                | 3.5E+15   | 1.6E+20       | 120,050yrs at Kd = 500                  | 4.36+11               | Unknown                               |                                 |
| 117                       | 1.18+02   | 6.0E+06       | 120,050yrs at Kd = 500                  | 3.0E-02 (Ba-137)      | Unknown                               | <b>X</b>                        |
| Camma Cama                | 2 45 ± 40   | 1.45+43       | 120,050yrs at Kd = 500                  | 3.5E+37               | Unknown                               | N (2)(4)                        |
| Cenum-144<br>Europium-154 | 4.0E+05   | 2.6E+08       | 1.1E+05                                 | 4.7E+00               | Unknown                               | (I) N                           |
|                           |   |               | O-Ayla at No.                           | 4 14                  | Unknown                               | N (!)                           |
| Eucopium-155              | No health based concentrations                            | lions         | Total deeny in 33yrs                    | CN                    |                                       | ;                               |
| Uranium-234               | 2.68+00   | 4.1E+02(3)    | 2.9E+0!<br>1,490yrs at Kd= 5            | 1.8E+00               | Unknown                               | <b>&gt;</b>                     |
| Uranium-235               | 2.9E+00 (J)   | 4,4E+02(3)    | 3.1E+01 (3)<br>1,490yrs #1 Kd=6         | 1.02-02               | Unknown                               | ¥                               |
| Uranium-238               | 2.9E+00 (3)   | 4.8E+02(3)    | 3.1E+01 (3)                             | 2.2E+00(3)            | Unknown                               | z                               |
| Neptunium-237             | 1.45+00   | 3.26+02 (3)   | 1.2E+0!<br>(Assumed Kd=0)               | 5.6E-02               | Unknown                               | >                               |
|                           |   | W-100         | \$ 330yrs at Kd=22                      | 3.78+00               | Unknown                               | ٨                               |
| Philonium-238             | 2.9E+00   | 6.0E+UZ       |   |                       |                                       |                                 |

### CUNTAMINANTS OF CONCERN RESIDENTIAL SCENARIO CPP-32 E

| CONTAMINANT            | INGESTION   | INI/DUST               | GROUNDWATER™                    | EXTERNAL<br>EXPOSURE | CURRENT<br>ESTIMATED<br>CONCENTRATION  | CONTAMINANT<br>OF CONCERN<br>(Y or N) |
|------------------------|---|------------------------|---------------------------------|----------------------|--|---------------------------------------|
| Plutonium-239          | 1.28+01   | 2.2E+02                | 5,330yrs at Kd = 22             | 3.95+00              | Unknown  | ٨.                                    |
| Plutonium-240          | 1,26+01   | 2.8E+02                | 5,330yrs at Kd=22               | 1.78+00              | Unknown  | Y                                     |
| Americium-241          | 1,4E+00   | 3.2E+02                | 81,650yrs at Kd=340             | 6.35-02              | Unknown  | ٨                                     |
| Non Radioactive Compon | Non Radioactive Components (mg/kg); Assumed based on HLLW consituents | d on HLLW constituents |                                 |                      | in the second se |                                       |
| Aluminum               | Reject - Track 2 Guidance   |                        |                                 |                      | Unknown  | Z                                     |
| Buron                  | 2.5E+04(3)  | No Data                | Kd Not Available                | NA                   | Unknown  | z                                     |
| Cadmium                | 2.76+02   | 8.0E+03(3)             | 1.1E+03 (3)<br>1,490yrs at Kd=6 | V.V                  | Unknown  | Y                                     |
| Calcium                | Reject - Track 2 Guidance   |                        |                                 |                      | Unknown  | Z                                     |
| Chloride               | No health based concentrations  | ikons                  |                                 |                      | Unknown  | z                                     |
| Chromium (Vf)          | 1.4E+03 (3)   | 1.2E+04(3)             | 1.3E+03 (3)<br>342yrs at Kd=1.2 | ٧٧                   | Unknown  | z                                     |
| Fluoride               | 2.0E+04(3)  | No Data                | 1.7E+04 (3)<br>54yrs at Kd=0    | NA                   | Unknown  | z                                     |
| Gadolinium             | No health based concentrations  | lions                  |                                 |                      | Unknown  | z                                     |
| lron                   | Reject - Track 2 Guidance   |                        |                                 |                      | Unknown  | Z                                     |
| Lead                   | 5.0E+02(3)  | No Data                | 24,050yrs at Kd=100             | NA                   | Unknown  | z                                     |
| Manganese              | 2.7E+04(3)  | 2.4E+06 (3)            | 12,050yrs at Kd=50              | NA                   | Unknown  | z                                     |
| Mercury                | 8.2E+01   | 1.8E+06(3)             | 24,050yrs at Kd=100             | ٧٧                   | Unknown  | Y                                     |
| Molybdenum             | L.IE+03 (3)   | No Data                | 1.1E+04 (3)<br>(Assumed Kd=0)   | NA                   | Unknown  | z                                     |
| Nickel                 | 5.4E+03(3)  | 5.8E+04(3)             | 24,050yrs at Kd=100             | <b>∀</b> X           | Unknown  | z                                     |
| Niobium                | No health based concentrations  | lions                  |                                 |                      | Unknown  | Z                                     |
| Nitrate (Nitrite)      | 2.7E+04(3)  | No Data                | 4.1E+04(3)                      | NA                   | Unknown  | Z                                     |
| Pattadium              | No health hesed concentrations  | tions                  |                                 |                      | Unknown  | z                                     |

# CONTAMINANTS OF CONCERN RESIDENTIAL SCENARIO CPP-32 E

|                       |                                       |               |              |          |                                       | FNANIMATION            |
|-----------------------|---------------------------------------|---------------|--------------|----------|---------------------------------------|------------------------|
| CONTAMINANT           | INGESTION                             | INH/DUST      | GROUNDWATER' | EXPOSURE | CURKENI<br>ESTIMATED<br>CONCENTRATION | OF CONCERN<br>(Y or N) |
|                       |                                       |               |              |          | 11-1-1-1                              | 2                      |
| Phosohorus            | No health based concentrations        | tions         |              |          | Cukinowii                             |                        |
|                       |                                       |               |              | ,        | Unknown                               | 2                      |
| Potassium             | Reject - 1 mer & Outsome              |               |              |          | Hoknowa                               | z                      |
| Rhodium               | No health based consentrations        | tions         |              |          |                                       |                        |
|                       | No beath based concentrations         | ijons         | ļ            |          | Unknown                               | 2                      |
| Kulhenium             |                                       |               |              |          | Unknown                               | z                      |
| Sodium                | Reject - Track 2 Guidance             |               |              |          |                                       |                        |
|                       | M. health heard concentrations        | lions         | 1.0E+06 (3)  | NA       | Unknown                               | z                      |
| Sullaic               |                                       |               |              |          | Unknown                               | z                      |
| Zirconium             | No health based concentrations        | tions         |              |          |                                       |                        |
|                       | 1 45 104                              | 2 OE+08 (6)   | 1.3E+06 (6)  | NA       | Unknown                               | (c) N                  |
| Hexone                | Latin                                 |               | 104014       | V.       | Unknown                               | <b>&gt;</b>            |
| Tetrachloroethylene   | 135+01                                | 3.1E+03       |              |          |                                       | (S) Z                  |
| Tributyl Phosphate    | 3.3E+05 (6)                           | 2.5E+10(6)    | 3.2E+06 (6)  | NA<br>NA | CIRLICATI                             |                        |
|                       | 20.25                                 | 1 RE + (9 (6) | \$,3E+02     | VV.      | Unknown                               | Y                      |
| 1,1,1-Trichloroethane | F)+ac+                                | (2)           |              | 42       | Unknown                               | <b>X</b>               |
| 1,1,2-Trichloroethane | 1.1E+01                               | 8.6E+05 (6)   | 1,15#104     |          |                                       | >                      |
| Trichloroethylene     | S.#E+01                               | 2.9E+06(6)    | 5,85+01      | NA       | Unknown                               |                        |
|                       | 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 |               |              |          |                                       |                        |

Using a 16m effective thickness to groundwater (interbed thickness only) as input to GW Screen.

For ingestion of lead, this was the concentration that causes increased blood lead levels in children. @ €

Not Applicable Ϋ́

Shade: Shaded areas represent the potential pathways of concern for the COC. RATIONALE FOR DELETION AS COC

More than 7 half lives will lapse during the 100 year institutional control period.

More than 7 half-lives have lapsed since the original incident in 1976. ≘ର୍ଚ

Based on the highest value in HLLW for this contaminant, saturated soil would exhibit an activity/concentration of the same order of magnitude, or lower, as compared to the risk based concentration. Therefore, it is not a COC for this pathway. Saturated soil concentrations were calculated based on a soil porosity of 25% and a dry soil weight of 1.5 mg/cc.

Although analytical data is currently unavailable, the risk based concentrations for these contaminants are significantly higher than process knowledge of the HLLW would allow. These Risk based concentrations are greater than or equal to the calculated specific activity of the pure radionuclide. € €

solvents must survive a steam stripper to get to the HLLW tanks.

## CONTAMINANTS OF CONCERN RESIDENTIAL SCENARIO CPP.79

| CONTAMINANT              | INGESTION   | INH/DUST    | GROUNDWATER™                        | EXTERNAL<br>EXPOSURE | CURRENT<br>ESTIMATED<br>CONCENTRATION | CONTAMINANT OF CONCERN (Y or N) |
|--------------------------|---|-------------|-------------------------------------|----------------------|---------------------------------------|---------------------------------|
| Radionuclides (pCi/g); A | Radionuclides (pCi/g); Assumed based on HLLW constituents | stiluents   |                                     |                      |                                       |                                 |
| Tritium                  | cannot measured soil activity                             | rity        | will be tested                      | NA.                  | Unknown                               | ٨                               |
| Cobalt-60                | 1.3E+07   | 6.5E+09     | 2,450yrs at Kd=10                   | 4.0E+02              | Unknown                               | N(I)                            |
| Sirvatium-90             | 1.26+02   | 3.96 + 05   | 774yrs at Kd=3<br>( > 7 half-lives) | NA                   | Unknown                               | Y                               |
| Zirconium-95             | No health based concentrations                            | lions       | 144,050yrs at Kd= 600               |                      | Unknown                               | N (2)                           |
| Niohium-95               | No health based concentrations                            | tions       | Sayrs at Kd=0                       |                      | Unkniwn                               | N (2)                           |
| Technetium-99            | 2.98+02   | 2.4E+05(3)  | 1.6E+02                             | 2.9E+03(3)           | Unknown                               | <b>&gt;</b>                     |
| Ruthenium-106            | 1.3E+31   | 2.9E+33     | 54yrs at Kd=0                       | NA                   | Unknown                               | N (2)                           |
| Antimony-125             | No health based concentrations                            | lions       | 12,050yrs at Kd=50                  |                      | Unknown                               | N (1)                           |
| lodine-129               | 2.0E+00   | 1.7E+04(3)  | 1.0E+00                             | 6.7E-02              | Unknown                               | ٨                               |
| Cesium-134               | 3.5E+15   | 2.8E+19     | 120,050yrs at Kd=500                | 4.3E+11              | Unknown                               | N (2)(4)                        |
| Cesium-137               | 1.38+02   | 1.0E+06     | 120,050yrs at Kd = 500              | 3.0E-02 (Ba-137)     | Unknown                               | Y                               |
| Cerium-144               | 2.6E+40   | 2.4E+42     | 120,050yrs at Kd = 500              | 3.5E+37              | Unknown                               | N (2)(4)                        |
| Europium-154             | 4.0E+05   | 4.5E+07     | 7.0E+03<br>54yrs at Kd=0            | 4.7E+00              | Unknown                               | N (I)                           |
| Europium-155             | No health based concentrations                            | tions       | Total decay in 33yrs                |                      | Unknown                               | N (1)                           |
| Uranium-234              | 2,68+00   | 7.35+01     | 2.0E+00<br>1,490yrs at Kd=6         | 1,85+00              | Unknown                               | Y                               |
| Uranium-235              | 2.9E+00(3)  | 7.8E+01 (3) | 2.1E+00 (3)<br>1,490yrs at Kd=6     | 1.08-02              | Unknown                               | Y                               |
| Uranium-238              | 2.9E+00(3)  | 8.5E+01 (3) | 2.1E+00 (3)<br>1,490yrs at Kd=6     | 2.2E+00 (3)          | Unknown                               | z                               |
| Neplunium-237            | 1.46+00   | 5.7E+01     | 7.4E-01<br>(Assemed Kd = 0)         | 5.65-02              | Unknown                               | ٨.                              |
| Plutonium-238            | 2.96+00   | .1E+02      | 5,330yrs at Kd=22                   | 3.7B+00              | Unknown                               | Y                               |

### CONTAMINANTS OF CONCERN RESIDENTIAL SCENARIO CPP-79

| CONTAMINANT            | INGESTION                      | INH/DUST               | GROUNDWATER™                   | EXTERNAL<br>EXPOSURE | CURRENT<br>ESTIMATED<br>CONCENTRATION | CONTAMINANT<br>OF CONCERN<br>(Y or N) |
|------------------------|--------------------------------|------------------------|--------------------------------|----------------------|---------------------------------------|---------------------------------------|
| Plutonium-239          | 1.28+01                        | 10+30;                 | 5,330yrs at Kd=22              | 3.96+00              | Unknown                               | Y                                     |
| Plutonium-240          | 1.26+0                         | 5.0E+01                | 5,330yrs at Kd=22              | 1.7E+00              | Unknown                               | Y                                     |
| Americium-241          |                                | \$.7E+01               | \$1,650yrs at Kd=340           | 6.3E-02              | Unknown                               | Y                                     |
| Non-Radioactive Compor | ; Assumed base                 | d on HLLW constituents |                                |                      |                                       |                                       |
| Aluminum               | Reject - Track 2 Guidance      |                        |                                |                      | Unknown                               | z                                     |
| Bornn                  | 2.5E+04(3)                     | No Data                | Kd Not Available               | NA                   | Unknown                               | z                                     |
| Cadmium                | 1,7E+02                        | 1.4E+03 (3)            | 9.7E+0!<br>1,490ys st Kd=6     | NA                   | Unknown                               | ٨                                     |
| Calcium                | Reject - Track 2 Guidance      |                        |                                |                      | Unknown                               | z                                     |
| Chloride               | No health based concentrations | lions                  |                                |                      | Unknown                               | z                                     |
| Chromium (VI)          | 1.4E+03 (3)                    | 2.1E+03(3)             | 1.1E+02 (3)<br>342yn et Kd=1.2 | V.V.                 | Unknown                               | z                                     |
| Fluoride               | 2.0E+04(3)                     | No Data                | 1.3E+03 (3)<br>54yrs at Kd=0   | <b>V</b>             | Unknown                               | z                                     |
| Gadolinium             | No health based concentrations | lions                  |                                |                      | Unknown                               | Z                                     |
| Iron                   | Reject - Track 2 Guidance      |                        |                                |                      | Unknown                               | z                                     |
| Lead                   | 5.0E+02 (b)(3)                 | No Data                | 24,050yrs at Kd = 100          | VV                   | Unknown                               | z                                     |
| Manganese              | 2.7E+04(3)                     | 4.3E+05 (3)            | 12,050yrs at Kd = 50           | V.                   | Unknown                               | z                                     |
| Mercury                | 10+82:8                        | 3.2E+05 (3)            | 24,050yrs at Kd = 100          | NA                   | Unknown                               | Y                                     |
| Molybdenum             | 1.1E+03(3)                     | No Data                | 6.7E+02 (3)<br>(Assumed Kd=0)  | NA                   | Unknown                               | z                                     |
| Nickel                 | 5.4E+03 (3)                    | 1.0E+04 (3)            | 24,050yrs at Kd = 100          | NA                   | Unknown                               | Z                                     |
| Niobium                | No health based concentrations | tions                  |                                |                      | Unknown                               | z                                     |
| Nitrate (Nitrite)      | 2.7E+04(3)                     | No Date                | 3.45+03                        | NA                   | Unknown                               | Y                                     |
| Palladium              | No health based concentrations | tions                  |                                |                      | Unknown                               | z                                     |

# CONTAMINANTS OF CONCERN RESIDENTIAL SCENARIO

|                       |  |               |              |                      |                                       | The Misse Free Co.     |
|-----------------------|--|---------------|--------------|----------------------|---------------------------------------|------------------------|
| CONTAMINANT           | INGESTION  | INH/DUST      | GROUNDWATER™ | EXTERNAL<br>EXPOSURE | CURKENI<br>ESTIMATED<br>CONCENTRATION | OF CONCERN<br>(Y or N) |
|                       |  |               |              |                      | 1-1-1                                 | z                      |
| Phoenhoris            | No health based concentrations   | tions         |              |                      | CIRTICAL                              |                        |
|                       |  |               |              |                      | Unknown                               | 2                      |
| Potassium             | Reject - Irack / Utildance   |               |              |                      | Unknown                               | z                      |
| Rhodium               | No health based concentrations   | lions         |              |                      |                                       |                        |
|                       |  | *****         |              |                      | Unknown                               | Z                      |
| Ruihenium             | No health based concentrations   |               |              |                      | Takasan                               | 2                      |
| Sodium                | Reject - Track 2 Guidance  | 43            |              |                      | DIRKIDA                               |                        |
|                       |  |               | 8 4E+04(3)   | NA                   | Unknowa                               | z                      |
| Sulfate               | No health based concentrations   | lions         |              |                      | 11st action                           | 7                      |
| Zirconitm             | No health based concentrations   | lions         |              |                      | CIRCIDALI                             |                        |
|                       |  | 1 6           | 8 15±03      | ٧X                   | Unknown                               | N (5)                  |
| Hexone                | 1.46+04  | (a) /n+a1.7   | 20.11        |                      |                                       | >                      |
| Tetrachloroethylene   | 135+01   | 1.4E+CC       | 1.7E+00      | NA                   | Unknown                               | •                      |
|                       | (3) 30 . 30 .  | 2 7E + 09 (6) | 2.0E+05 (6)  | ٧X                   | Unknown                               | N (5)                  |
| Tributyl Phosphate    | 3.35+03 (0)  | (2) (2)       | 10 -44 -     | 42                   | Unknown                               | Y                      |
| 1,1,1-Trichloroethane | 2.55+04  | 3.2E+08 (6)   | 6.78*UI      |                      |                                       | <b>&gt;</b>            |
| 1.1.2-Trichloroethane | 1.18+01  | 1.5E+05 (6)   | 6.7E+02      | ٧٧                   | CIINIDAII                             |                        |
| Trichloroethylene     | 5.85+01  | S.1E+05 (6)   | 5.05+00      | NA                   | Unknown                               | Ā                      |
|                       | Company of the Compan |               |              |                      |                                       |                        |

Using a 16m effective thickness to groundwater (interhed thickness only) as input to GW Screen. For ingestion of lead, this was the concentration that causes increased blood lead levels in children.

Not Applicable

Shade: Shaded areas represent the potential pathways of concern for the COC.

RATIONALE FOR DELETION AS COC

(1) More than 7 half-lives will lapse during the 100 year institutional cont

(2) More than 7 half-lives have lapsed since the original incident in 1976.

(3) Based on the highest value in HLLW for this contaminant, saturated s

More than 7 half-lives will lapse during the 100 year institutional control period.

More than 7 half-lives have lapted since the original incident in 1976.

Based on the highest value in HLLW for this contaminant, saturated soil would exhibit an activity/concentration of the same order of magnitude, or lower, as compared to the risk based concentration. Therefore, it is not a COC for this pathway. Saturated soil concentrations were calculated based on a soil porosity of 25% and a dry soil weight of 1.5 mg/cc.

Although analytical data is currently unavailable, the risk based concentrations for these contaminants are significantly higher than process knowledge of the HLLW would allow. These Risk based concentrations are greater than or equal to the calculated specific activity of the pure radionuclide.

solvents must survive a steam stripper to get to the HLLW tanks.

These numbers are of the same order of magnitude, or higher, as would be obtained from soil saturated with pure product. 9

#### **MEMORANDUM**

To:

Files on Contaminants of Concern (COC) for OU3-7 and OU3-8

COC for Incidents Involving High Level Liquid Waste (HLLW) from the Subject:

Tank Farm

A list of potential contaminants of concern for the CPP-26, CPP-32e, CPP-79 sites was generated based on the constituents of High Level Liquid Waste (HLLW). Each of the sites involved contamination from the HLLW system. (The rationale is applicable to any sites where soil is contaminated with HLLW.) The constitutes were obtained from a R. I. Donovan letter of 8/14/89, "1989 Tank Farm Inventory" (RID-08-89). The potential contaminants Tributyl Phosphate and Hexone were also added to the list of potential contaminants based on process knowledge of their involvement in fuel reprocessing. Tetrachloroethylene, 1.1.1trichloroethane, 1,1,2-trichloroethane, and trichlorethylene were also added to the list due to suspicions that significant quantities went through the PEW and may have gotten to the PEW bottoms that go to the tank farm.

Risk based concentrations for different pathways (Ingestion, Inh/Dust, Groundwater, External Exposure) were produced for each of the COC under a residential scenario. If actual analytical results where available for these different sites, a comparison to the risk based concentrations could take place to determine if risk levels were exceeded. If the risk levels are not exceeded However, with limited exceptions, there are no then there is no concern. analytical data available on the sites under investigation and therefore assumptions were made to estimate the maximum contaminant concentrations that could be expected. The rational used was to assume the following:

- 0 The incident involves soil saturated with the HLLW (even if dilution was likely to have been involved);
- 0 Porosity of the soil is 25% (i.e., of a lcc volume, .25cc, or .25ml, could be taken up by the HLLW);
- The weight of the soil to be 1.5 grams/cubic centimeter; and 0
- 0 The waste solution weight is assumed to be the same as water.

With these assumptions a cc of soil would weight 1.75 g (1.5 g for the soil and .25 g for the liquid contaminant) and it would contain .25 ml of the liquid. From this, a concentration conversion factor of .25 milliliters / 1.75 grams mass can be generated, which is .143 ml / q.

With these assumptions the following steps were taken to calculate the concentration levels of the contaminates of concern. Trying to get the worst case scenario, the document that R. I. Donovan supplied was used to picked out the highest concentration level for each of the contaminants of concern in the HLLW. There are two categories of contaminants, chemical and radiochemical. The chemical contaminants were found using the high value and the 0.143 ml/g conversion factor. For example:

For cadmium, the high concentration from the R. I. Donovan letter was 11.69 g/L or 1.2E-02 g/ml. If in the soil this becomes

$$(1.2E-02 \text{ g/m})(0.143 \text{ m})/\text{g} = 1.7E-03 \text{ g/g} = 1.7E+03 \text{ mg/kg}$$

This last number is the maximum cadmium concentration due to the HLLW in a saturated soil sample.

The Radiochemical contaminants were also found using the high value, and the conversion factor and, depending on whether the concentration was reported as gm or Ci per volume, the Specific Activity formula. Uranium and Plutonium were found by using a second table provided by R. I. Donovan which broke these contaminants into isotopes (the letter reported U and Pu as total values of all isotopes). As an example of the calculation for a radionuclide,

For Technecium-99, the high concentration in HLLW is .98 mg/L or 9.8E-04 g/l. The Specific Activity for Te-99 is

Spec. Act = 
$$3.578E+05/(2.13E+05)(99)$$
 =  $1.7E-02 Ci/g$  =  $1.7E+10 pCi/g$ 

(Where 2.13E+05 is the half-life and 99 the atomic weight.)

Conc. in Ci is

$$(9.8E-04 g/L)(1.7E+10 pCi/g) = 16.7E+06 pCi/L = 1.67E+04 pCi/ml$$

and the concentration in saturated soil is

$$(1.67E+04 pCi/m1)(0.143 m1/g) = 2.4E+03 pCi/g$$

Feeling the concentrations calculated in this manner are conservative (worse case) they were compared to the risk based concentrations. If the risk levels were of the same order of magnitude or higher, it was felt the site contaminant could never exceed them, and the contaminant was removed from the list of contaminates a concern. The calculated saturated soil concentrations are provided in the table on the following page.

Calculated Saturated Soil Concentration

| Radionuclides | Conc.<br>(pCi/g) | Non-Rad Components | Conc.<br>(mg/kg) |
|---------------|------------------|--------------------|------------------|
| Strontium-90  | 9.2E+07          | Boron              | 2.6E+02          |
| Technecium-99 | 2.4E+03          | Cadmium            | 1.7E+03          |
| Iodine-129    | 1.1E+04          | Chromium           | 9.6+01           |
| Cesium-137    | 9.3E+07          | Fluoride           | 5.5E+03          |
| Europium-154  | 1.3E+06          | Lead               | 3.9E+01          |
| Uranium-234   | 1.4E+02          | Manganese          | 1.5E+02          |
| Uranium-235   | 4.0E+00          | Mercury            | 1.2E+02          |
| Uranium-238   | 7.1E+00          | Molybdenum         | 1.0E+01          |
| Neptunium-237 | 2.3E+02          | Nickel             | 4.6E+01          |
| Plutonium-238 | 8.3E+04          | Nitrate            | 5.1E+04          |
| Plutonium-239 | 1.1E+04          | Sulfate            | 9.8E+02          |
| Plutonium-240 | 4.0E+03          |                    |                  |
| Plutonium-242 | 2.3E+00          |                    |                  |
| Americium-241 | 1.3E+05          |                    |                  |
|               |                  |                    |                  |